BOOK REVIEW

DAVID MOORE. 2013. **Fungal Biology in the Origin and Emergence of Life.** (ISBN-13: 978-1-107-65277-4, pbk.). Cambridge University Press, 32 Avenue of the Americas, New York, New York 10013-2473, U.S.A. (**Orders:** www.cambridge.org, 1-212-337-5000). $42.99, 236 pp., 28 b&w illustrations, 2 tables, 6" × 9".

Mycologists will welcome this book! Too often fungi are ignored in discussions about the origin of life as well as their importance to world ecosystems. This book, as the title implies, considers the role of fungi in later eukaryote evolution. Heretofore emphasis on prebiological evolution, protocells, and biofilms led to prokaryotic discussions of the earliest pathways of evolution and mostly ignored the role of fungi. Moreover, the central thesis of this book "… is based on appreciation of the central role of the fungi grade of organization in the evolution of higher organisms."

Chapters 1 and 2 discuss the diversity of present-day fungi in form, function, and biology. Chapter 3 describes the formation of the solar system that gave birth to the Earth and Moon. Chapter 4 highlights the carbon-based molecules present that contributed to the early building blocks of organic compounds necessary for life on Earth. The panspermia hypothesis (extraterrestrial origin of life) is explored in Chapter 5 which is not a viable scientific option for the author. In Chapters 6 to 10 (pages 70–141) much attention is given to the first formation and definition of life on young earth. The reader has to wait more than halfway through the book for Chapter 11 "Toward Eukaryotes." However, one of the more interesting observations is based on the theme "are animals necessary?", especially since humans asking the question are animals. The author argues for a balanced life system: bacteria to begin, green plants as producers, and fungi as decomposers. The bottom line is that Earth could exist without animals and still be balanced. I recommend Chapter 8 "It's life, Jim …" for any general biology student who wants to review the properties of a "living" system: LIFE.

Finally we arrive at the "Rise of the Fungi" in Chapter 12 and the discussion of *Prototaxites*, the largest organism present during the Devonian period (up to 9 meters tall). Recent evidence strongly suggests that this was a giant terrestrial saprotrophic fungus with hyphae and spores and was the dominant living form on this ancient landscape. Imagine a fungus the size of a small tree that lasts for 40 million years about 420 million years ago. Add to this the incredible diversity of fungal forms—chytrids, sexual reproductive stages, Ascomycetes, and more, beautifully preserved, found in the Devonian Rhynie Chert of northern Scotland, mostly by Tom Taylor and coworkers at the University of Kansas—and one appreciates that fungi have played a significant role in the evolution of life on planet earth for a long time. Far longer than once thought! More discussion here includes the importance of sclerotia (fungal mass of hyphae), free cell formation, filamentous growth, cell fusion, and septum (cross wall) formation that are all found in fossil and extant fungi.

This is a must-read, fascinating book for anyone interested in evolution or fungi. Some chapters are highly technical, but others are easily understood by a nonscientist. Table 1 gives a geological and biological chronicle of events on Earth from 2500 million years ago to present day. References are cited and occupy pages 204–218, many of more recent origin. There is no glossary which sometimes complicates some of the terminology, but this is a minor distraction. The Index (pages 219–231) is a convenient shortcut to specific topics.

Every scientist interested in the broad topic of evolution of life on Earth should have this book on their bookshelf. It is affordable, readable, understandable, and easily could be used in evolution-based seminars or as selected reading for general biology courses.—*Harold Keller, PhD, Research Associate, Botanical Research Institute of Texas, Fort Worth, Texas, U.S.A.*